9 Wood energy markets, 2010-2011

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Highlights

- Global wood energy markets continue to grow, driven primarily by demand in the EU and its commitment to meet 20% of energy consumption from renewable sources by 2020.
- Large investments in industrial pellet-production capacity have been made under expectations of a continuously growing demand, mainly from the EU.
- Concern about how energy and climate-change policies may be affecting wood market dynamics and existing wood-using industries, has to led to calls in Europe for a detailed evaluation.
- Canada and the US remain the major suppliers of woody biomass feedstock, primarily pellets, to the EU. Canadian exports of industrial pellets are expected to grow in 2011.
- A joint effort between APX-ENDEX and the Port of Rotterdam in the Netherlands has created a wood energy commodity contract exchange market, to be launched in the second half of 2011.
- Prices for industrial pellets in the EU declined in the third quarter of 2010, but have maintained an upward trend through mid-2011.
- The Russian pellet market is developing rapidly as new corporations and partnerships support a trend towards increasing unit size of production per plant: the world's largest pellet-producing facilities are being built currently in the Russian Federation.
- Several Russian regional governments are successfully stimulating the use of wood energy for municipal heating.
- New rules for the US Federal Biomass Crop Assistance Program have been issued, with a tier system of match payments that reflects emphasis on cellulosic liquid biofuels.
- The US Environmental Protection Agency (EPA) will revisit and thoroughly assess greenhouse gas emissions from biomass and energy generating technologies and rule whether they will require CO_2 emission permits after the current three-year moratorium ends in 2013.
- The expansion of wood energy to date has been largely policy-driven and there is a degree of anxiety over what might happen, if there were to be any major shift in public policy and the financial incentives that have supported it.
- Revisions of the CO_2 neutrality of wood energy could severely affect markets in the EU and North America.

9.1 General energy market developments

Demand for woody feedstock is increasing, motivated by public policies that have set ambitious targets for renewable energy: for instance, the EU's aim of meeting 20% of its overall energy requirement from renewable sources by 2020 and, to a certain extent, the renewable portfolio standards in Canada and the US. Financial support to improve the cost-competitiveness of wood energy with fossil fuels will be instrumental to sustaining growth in the sector. The spike in oil prices in 2011 has provided a further rationale for choosing wood rather than fossil fuels.

International wood pellet markets grew in 2010. Increased exports from North America to the EU and the announcement of a new global commodity market for trading industrial wood pellet contracts have consolidated expectations about growth in wood energy consumption.

9.2 Europe subregion

9.2.1 Europe: policies driving markets

9.2.1.1 Policies promoting renewable energy

Industrial pellets still dominate the EU's wood energy trade market, although industry co-products such as chips and sawdust take a large market share for local and regional consumption. The EU 2020 targets for renewable energy and the reduction of greenhouse gas (GHG) emissions are among the main drivers of growth in EU wood energy consumption. The 2020 targets require that at least 20% of energy consumption should come from renewable energy sources (European Commission, 2011). Research suggests that extra demand for woody biomass triggered by these targets could reach 305 million tonnes of wood (Sikkema et al., 2011).

Additional supplies of woody biomass could come from 45 million tonnes related to increased harvesting levels and about 400 million tonnes from the recovery of post-harvesting residues from altered forest management, the recovery of post-consumer wood through recycling, from the establishment of woody energy crops, and from agriculture. The research concluded that any short-term shortages of wood pellets to meet renewable energy targets within the EU-27 could be bridged by imports from nearby areas such as north west Russia. Long-term wood energy deficits could be supplied from North America and the Russian Federation.

Public financial support has been instrumental in helping large pellet operators cover the high costs of capital investment, operation and maintenance of renewable energy equipment, and pellet fuel feedstock procurement. US and Canadian pellet plants have invested in large infrastructure to supply a growing, policy-driven demand from European power plants (Sikkema et al., 2011). There is also a trend emerging towards buying pellets up to three years in advance of delivery (Energeia, 2010; Romjin 2010).

The United Kingdom provides examples of public programmes developed to foster the use of wood feedstock in non-domestic and domestic energy generation. The UK's portfolio of financial incentives for heat and electricity generation includes the following:

- Renewables Obligation Certificates, which are tradable certificates issued under the Renewables Obligation programme for electricity generated from renewable sources. The programme targets large-scale licensed electricity suppliers. It requires the suppliers to source a proportion of all the electricity they supply from eligible renewable sources, including both dedicated biomass generation and biomass co-firing. The proportion of electricity to be supplied from renewables should increase each year to 15.4% by 2015-2016.
- Feed-in-Tariffs (FIT) Scheme, which encourages the deployment of small-scale (< 5MW) low-carbon electricity capacity by guaranteeing a fixed payment per kWh of electricity generated. The scheme also pays for any unused electricity exported to the grid. The feed-in-tariffs paid to micro Combined Heat and Power (CHP) with total installed electrical capacity of 2kW or less and available only for 30,000 units is set at 10.5 pence/kWh (Office of the Gas and Electricity Markets, 2011).
- Renewable Heat Incentive, which provides long-term guaranteed payments made quarterly over a 20-year period. The payments are available to renewable heat installations of all sizes with a launch target for the second quarter of 2011 (UK Department of Energy and Climate Change, 2011). It is estimated that a non-domestic 150kW biomass boiler running at an annual load factor of 30% using woodchips, wood pellets or logs could receive between 1.9 pence and 7.6 pence per kWh, depending on its size, and domestic biomass boilers could receive an average 4.75 pence per kWh (Econergy, 2011).

9.2.1.2 Impact of EU energy and climate policies and initiatives

The EU has set an important example by its positive lead in recognizing wood as a clean renewable source of energy with considerable potential to meet Europe's future energy needs. Setting targets for renewable energy and drawing up national biomass action plans is a development that is now mirrored in many countries beyond the EU's borders. It has brought the potential of

wood as an energy source into sharp focus; and incentives to improve energy efficiency and adopt the latest technologies have encouraged investment across Europe, helping to reduce reliance on fossil fuels.

Sweden is often cited as an example of what can be achieved through public policy. By 2020, the proportion of energy to be supplied by renewable sources in Sweden has been set at 50%+ of total energy use, in line with EU Directive No. 2009/28/EC (Swedish Energy Agency, 2010). And at 44.7%, Sweden is already using the highest proportion of renewable energy in relation to final energy use of any country in the EU. Sweden has also set another ambitious target for 2020: reducing 1990 GHG emissions by 40%.

Wood fuels (27.7 TWh) form the greatest part of the 42.2TWh total amount of the biofuels Sweden uses for heat production. These biofuels consist mainly of logging residues and solid forest products industry co-products. Their use in the Swedish district heating sector has increased more than five-fold since 1990 (Swedish Energy Agency, 2010). Although most are locally grown, many are imported. The Swedish Energy Agency estimates that almost a fifth of the quantity of wood pellets used in the country are net imports.

Some industry sectors, however, are becoming increasingly worried about how EU and national policies may affect wood markets; in particular, the European Commission's Climate Change and Energy Package. Some environmental groups, too, are questioning the use of wood as a fuel, especially for producing electricity without the recovery and use of heat. There is therefore a need for an informed and participatory evaluation of the effect of using woody feedstock on the forest resource as well as the net difference in GHG emissions compared with fossil fuel alternatives.

The most efficient way to use wood for energy, in terms of recovering the highest percentage of its energy content, is to generate heat (90% efficiency), such as in district heating systems and individual house boilers (using the latest technology and with strict control over fuel quality). CHP is the next most efficient (65%-70%), followed by electricity generation (35%).

The growing demand for wood for industrial processing and energy generation is leading to increased competition for wood supplies and prices have increased. It is difficult, however, to separate the price increases coming from rising costs of labour, transport and energy from those that result from competition.

A Preliminary Draft Opinion issued by the European Economic and Social Committee's Consultative Commission on Industrial Change stressed that the woodworking and furniture sector "faces growing competition for wood from the renewable energy sector, due to subsidies and other measures promoting the use of biomass, of which wood makes up a major share" (Zbořil and Pesci, 2011). The Committee has expressed serious concern about the market effects of EU policies that have made it more profitable to burn wood than to use it for manufactured products. It has called for a detailed evaluation of the market dynamics of wood raw materials for forest-based industries and for the renewable energy sector.

9.2.2 *Europe market developments*

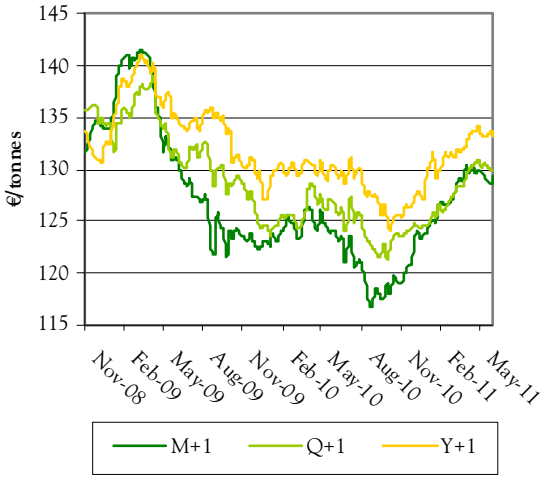
9.2.2.1 *Wood pellet market development*

A joint market consultation study among market participants and other stakeholders conducted by APX-ENDEX (the Anglo-Dutch energy exchange) and the Port of Rotterdam stressed the growth potential of the industrial wood pellets market and the need for exchange-traded biomass products. Both parties decided to further develop the biomass market. In November 2010, APX-ENDEX announced plans to launch exchange-traded industrial wood pellet contracts in mid-2011 (APX-ENDEX 2010).

Recent market trends for industrial wood pellet prices, as reported by APX-ENDEX appear below (graph 9.2.1). The footnote reference to "prices for upcoming year" means that, for instance, 2011 would represent prices for 2012. Trends show that the market price was highest in January-March 2009, after which it declined to its lowest ever recorded level, in the third quarter of 2010, and then started to rise again well into 2011.

GRAPH 9.2.1

Industrial wood pellet prices, 2008-2011



Notes: Industrial Wood Pellet Prices APX-ENDEX. Prices given in Euros per tonne, based on delivery CIF Rotterdam and net value of 17 MJ/kg (with water content less than 10%). M+1 represents price traded per tonnes for the upcoming month, Q+1 is next quarter price, and Y+1 captures prices for the upcoming year.

Sources: APX-ENDEX, 2011.

To address questions about the sustainability of materials used in producing industrial wood pellets, APX-ENDEX has drawn up draft guidelines for the market characteristics of industrial wood pellets. All deliveries will need to offer proof that the product originates from feedstock obtained in a sustainable manner. Cargo delivered under this specification must also be accompanied by proof of sustainability.

APX-ENDEX has listed several certification schemes but will reduce this number to only a few, based on the industry initiative, to come up with a common standard acceptable to all parties. Government programmes are also building in sustainability requirements for the use of woody biomass for energy. For example, the UK's Renewable Heat Incentive for biomass (wood-fuelled) heating is to develop sustainability criteria as part of a consultation process to take place in 2012. This will measure the impact of the use of biomass energy both on forests and in terms of GHG emissions. Sustainability criteria will become mandatory from 2013.

9.2.2.2 Market trends

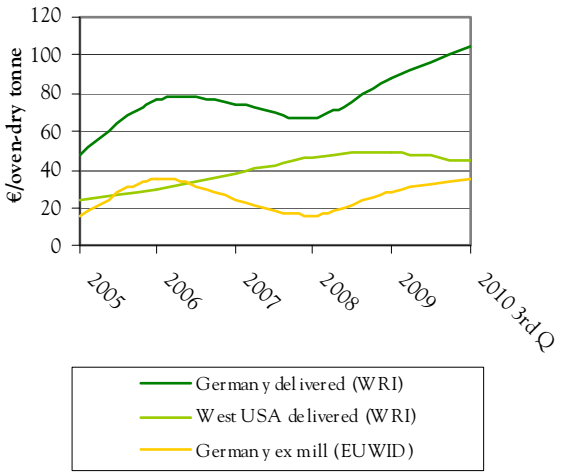
In Europe in 2009, around 650 pellet plants produced more than 10 million tonnes of pellets (Sikkema et al., 2011). Total European consumption was about 9.8 million tonnes, 9.2 million of which were consumed within the EU-27. While most markets of non-industrial pellets are largely self-sufficient, industrial pellet markets depend on wood pellets imported from outside the EU-27, mainly from North America and the Russian Federation. Because of their advanced storage facilities and long-term price-setting, industrial pellet markets are relatively mature, compared with non-industrial ones. However, industrial pellet markets remain highly dependent on public support schemes.

Prices per tonne of oven-dry sawdust in selected markets have shown high price fluctuation, with a general upward trend in selected regions, e.g. Germany and western US (graph 9.2.2). The average price for sawdust delivered to consumers in Germany has increased at a higher rate than sawdust produced at the sawmill (ex-mill). This increase in price margins might have been due to increasing transport costs and higher local demand.

Sawn-timber production decreased across North America and Europe in 2008-2009 and this, in turn, meant that less feedstock was available for energy. Simultaneously, the pulp and paper sector and the wood-based panel sector (especially oriented strand board (OSB)) slashed their input needs, leading to availability of alternative feedstock for the pellet sector from low-quality logs (pulpwood) and sawmill chips.

GRAPH 9.2.2

Development of sawdust prices, 2005-2010



Sources: Sikkema R, Steiner M, Junginger H M, Hiegl W, Hansen M T and Faaij A 2011.

9.3 CIS subregion focusing on the Russian Federation

The Russian Federation's forest and wood-working sectors face significant development challenges. The forest sector is confronted with rising transport costs. The stakeholders in the reconstruction and modernization process of the municipal heating sector often have conflicting interests. And the investment climate in the wood-working sector can be labelled as bleak.

Still, the domestic wood energy market and the export of pellets are continuing to grow. Federal legislation and regional development plans are pushing the domestic use of wood energy, and intergovernmental relations and public-private cooperation are clearly improving. As production levels of the forest and wood-working sector recover, wood co-products will become more readily available. In the light of existing plans for several large Russian pellet-manufacturing facilities and installed production capacity, levels of production and exports of pellets seem bound to increase.

9.3.1 Russian Federation: policies driving markets

National political priorities include improved energy efficiency and increased use of renewable energy sources (RES). The main decrees, laws, national standards on renewables, and the energy strategy through 2030 were formulated in 2009. In 2010, the government continued to issue related legal documents that provide legal implements, incentives and targets to further promote the use of renewable energy.

Improving the investment climate and creating a level playing field are important to the Russian wood energy market and to the Russian wood sector in general. The country's forest and wood-working sectors need a governmental strategic development plan with clear long- and short-term goals to set priorities and provide market-development analyses and economic prognoses (Anufrieva, 2010).

Modernizing the municipal heating sector is also of vital socio-economic importance. Most district heating plants need reconstructing. In many Russian regions, it is now lucrative to convert municipal heat supply from fossil fuels to local RES; wood being the most common. Furthermore, fossil fuel prices and transport costs are constantly rising.

Regional governments have made striking progress in the 12 months up to May 2011. Several are introducing development plans and achieving tangible results in stimulating the use of wood energy for municipal heating. An increasing number of district heating plants are being converted to RES. Traditional difficulties in organizing and establishing private-public cooperation on the use of local energy sources are gradually being overcome. The system of financing municipal heating in the Russian Federation, however, remains complex and still poses an obstacle to the conversion to local energy sources.

The government of the Republic of Karelia has a programme to develop the heat sector, using local RES. Intergovernmental cooperation is in place between the Agency of Housing and Energy, the Ministry of Natural Resources and Ecology, and the Ministry of Economic Development. Of the 429 municipal boiler houses, 132 run on fuelwood and 17 on wood chips. In 30% of the 181 boiler houses that run on coal, wood is co-fired in spring and autumn.

Wood energy accounts for 18% of the Republic's municipal heat supply. In 2009 and 2010, wood harvesting levels were low and in some regions came to a halt. As a result, there was a deficit of fuelwood. Last winter, this problem was solved by transporting wood over long distances. The government has developed a more permanent solution: the regional forestry agency will carry out selective maintenance cuttings in the regions where commercial activity is not strong, currently (Sokolov, 2011).

Several related development and international cooperation projects have been started. Approximately $300 billion will be invested to decrease the energy spent per GDP by 40% by the year 2020, according to the "Energy saving and energy efficiency improvement till 2020" decree (Russian Government, 2010). This should save the economy $35 billion a year on energy. The International Finance Corporation (part of the World Bank) announced a $165 million five-year investment and consulting programme within the Russian renewable energy sector. The programme is estimated to install 205 MW of renewable generation capacity (The Moscow Times, 2010).

Several European countries (e.g. Italy, Finland, Norway and Sweden) and the EU have collaborated with the Russian Federation on energy efficiency and renewable energy projects. The United Nations Economic Commission for Europe (UNECE) is helping several Russian regions draw up Biomass Action Plans. The Russian Federation can benefit from the practical experience of European and other countries in using the latest technologies for CHP based on co-products, low value roundwood and forest residues.

The use of wood co-products can boost rural employment, increase the profitability of the woodworking sector, and trigger technological innovation. Thinning and other forest operations are costly but are becoming more common.

In general, forest stand quality in the Russian Federation is poor; the percentage of low-value fuelwood is high. Maintenance cuttings could increase forest productivity. Harvesting residues are usually just left behind, increasing the possibility of wildfires. The Forest Agency is adopting norms to promote the use of these forest residues. But the growth of the wood energy market is broadly considered to be sustainable, aside from the ecological risks and problems in the country's forestry today.

The Russian pellet market is highly oriented towards exporting to Europe. In the coming years, additional sustainability demands on woody biomass imports can be expected. European demand for Russian wood for energy will certainly rise. For example, Finland intends to increase its use of renewable energy from the current 25% to 38% by 2020. It has successfully increased its domestic production of wood for energy, which has risen six-fold since 2000, but the country will need more imports. Finland uses mostly wood chips with a few pellets. Possibilities of increasing the import of chips overland from the Russian Federation have been studied since 2008 (Metla, 2011a). In 2010, 61% of Finland's wood imports came from the Russian Federation, of which chips were the most traded assortment. Fuelwood imports to Finland were booming in 2009 but plummeted by 84% in 2010 (Metla, 2011b).

Wood energy projects in the Russian Federation can benefit enormously from Joint Implementation projects under the Kyoto Protocol. The government approved 15 such projects in July 2010, and another 18 in December 2010. On 9 June 2011, President Medvedev called on the government to make use of the Kyoto mechanisms while

they are still in effect (ITAR-TASS, 2011). Today, the 33 projects are in place and achieving satisfactory results (Usievich, 2011).

9.3.2 Russian Federation market developments

Although wood pellet production capacity in the Russian Federation continues to grow, less than one-third is utilized. Estimated annual production is 750,000 tonnes, of which 600,000 tonnes are exported. The Russian Federation and Europe have begun to publish data on the export and import of pellets. In contrast to earlier estimates by business consultants, the government statistics appear to understate actual trade levels.

Export prices have dropped to approximately €105-€110 per tonne FOB in the port of St. Petersburg and Ust-Luga (Ivin, 2011). Exports, almost exclusively industrial pellets and handled by traders, are mainly shipped across the Baltic Sea in loads ranging from 2,000 tonnes - 7,000 tonnes.

As Sweden and Denmark account for roughly half of the exports, the exchange rates of their local currencies are of importance. The euro and the Danish krone devalued by 12% against the rouble between June 2010 and November 2010, recovering 8% by June 2011. The Swedish krona devalued 15% but recovered only 5% over the same period.

There are almost 200 pellet-producing companies in the Russian Federation, of which two produce more than 100,000 tonnes per year. In regions with an established pellet market, fluctuations in raw material availability and increasing wood co-product prices are restructuring the market. Corporations and partnerships have been founded and the trend towards bigger plants with higher capacities per plant is continuing. Large, capital-intensive companies are replacing small ones. Increasing domestic demand could create new opportunities for small local companies. The domestic market for charcoal and briquettes is also developing.

Profit margins in the Russian pellet market are low, and many production plants closed in 2010-2011. The market potential, according to some studies, nonetheless remains high (Raktovskaya, 2011). Companies (of all sizes) with their own feedstock prove to be less prone to bankruptcy. Having an outlet for their wood co-products is in itself an incentive. Companies are converting their heat supply to local RES, especially those with their own wood chips or sawdust. Pellet production is spreading to inland regions with under-utilized co-products and low-value forest stands.

Domestic and foreign demand can be expected to rise in the coming years. On 16 June 2011, the Russian Energy Agency, the holding INTER RAO UES, and China's National Bio-Energy Company agreed to found the joint venture "Green Energy Cooperation".

Production has now started at the world's largest pellet plant, in the Leningrad region, built by Vyborgskaya Cellulose and Ekman & Co. The plant has a projected production capacity of 1 million tonnes per year. A new holding, Russian Wood Pellets, plans to produce 3 million tonnes of wood pellets at 13 locations in the North-west and Central (around Moscow) Russian federal districts.

With this initiative, the Russian pellet sector could be entering a new era of cooperation between governmental organizations and private companies. The holding can get a 50% discount on wood procurement (on the basis of Decree No. 419 of July 30, 2007 on "Priority investment projects in the field of forest harvesting").

9.4 North America subregion

9.4.1 US: Policies driving markets

9.4.1.1 Impact of federal policies

The wood energy market in the US comprises four major sectors: industrial (68%), residential (20%), electricity (9%) and commercial (3%). The industrial sector represents the wood products, pulp and paper industry; and the amount of wood energy it consumes has been mainly linked to wood product output rather than public policies. The other three sectors have been the main target of public policy at both federal and state levels. Historically, public policy has focused on promoting the use of biomass for electricity while, in recent years, there has been a shift to greater support for liquid fuels for transport.

According to a recent publication, the most effective federal incentives introduced since 2004 appear to be (a) the Renewable Energy Production Tax Credits, (b) Clean Renewable Energy Bonds, (c) Qualified Energy Conservation Bonds and (d) Investment Tax Credits (Aguilar et al., 2011). All of these are tailored to the electricity generation sector. It is also suggested that the eligibility of open-loop biomass plants (i.e. not relying on bio-energy dedicated crops, but instead on material harvested from working forests and industry co-products) for Renewable Energy Production Tax credits have favoured the greater use of woody materials, particularly in the electricity sector. Regulatory policy instruments that set renewable energy targets, such as the federal Green Power Purchasing Goal and state renewable portfolio standards, have encouraged the use of biomass as an eligible renewable energy feedstock, but a significant impact on wood energy consumption remains to be seen.

Biomass Crop Assistance Program (BCAP) implementation guidelines (section 9.4.1.2) have been recently updated. BCAP, a policy established to help meet US Federal Renewable Fuel Standards, mandates increased national biofuel use to reach 136 billion litres a year by 2022, with 21 billion gallons per year (79.5 billion litres) from advanced biofuels (US Public Law 110–140).

9.4.1.2 Carbon neutrality of biomass energy

Although the electricity sector has been a major beneficiary of federal public policy support, it has recently been facing increased scrutiny because of GHG emissions. Whether power generation using woody feedstock is considered a GHG carbon-neutral option is under debate. On 12 January 2011, the US Environmental Protection Agency (EPA) announced its plan to defer for three years the requirements for GHG permits for CO_2 emissions from biomass-fired and other biogenic sources (EPA, 2011).

EPA has been developing guidelines to restrict emissions from certain stationary sources, such as electric power plants. It has suggested the possibility that emissions from biomass might be treated on the same terms as emissions from fossil fuels. At the same time it recognized the uncertainty about the carbon offset benefits of wood and other biomass sources (EPA, 2010). It is proposing studies during this three-year period that will (a) include a review of available technical information on biogenic emissions and (b) seek to develop accounting options for CO_2 from stationary sources that satisfy principles of predictability, practicality and scientific soundness. Four broad types of accounting approaches are being considered:

- Case-by-case analysis of individual source-specific permit applications.
- Categorical exclusion of biogenic CO_2 emissions from Prevention of Significant Deterioration (PSD) permitting.
- Exclusion of biogenic CO_2 emissions from PSD permitting contingent upon the US land-use sector's remaining a "net sink".
- Differential treatment of feedstock via approaches reflecting feedstock-specific attributes (GPO, 2011).

Biogenic CO_2 emissions being reviewed include diverse sources such as those derived from combustion of biological material, including all types of wood and wood co-products, forest residues, and agricultural material (EPA, 2011a).

To aid decision-making about building biomass energy plants during the three-year deferral period, EPA is providing guidance for determining when biomass and biogenic sources meet requirements to provide Best Available Control Technology (BACT) for reducing CO_2 emissions (EPA, 2011b). The EPA decision triggered different reactions. Wood energy industry representatives have expressed concern that regulating wood energy CO_2 emissions such as those from co-firing it with coal could stop investment in wood-using power plants (Barnard, 2010). And environmental groups, including the Natural Resources Defense Council and Southern Environmental Law Center, are opposing the proposal to allow a three-year exemption from carbon emission regulations (Maron and ClimateWire, 2011). The Edison Electric Institute, an association of shareholder-owned electric power companies, supports the three-year deferral and supports the view that wood energy CO_2 emissions should be considered carbon neutral (EEI, 2011).

Source: M. Fonseca, 2010.

9.4.1.3 Biomass Crop Assistance Program

BCAP was authorized by the Food, Conservation, and Energy Act of 2008 (US Public Law 110-246) to provide financial assistance to owners and operators of agricultural and non-industrial private forest land who wish to establish, produce and deliver biomass feedstocks (US Federal Register 2010). BCAP provides (a) matching payments for no more than two years to eligible material owners, at a rate of $1 for each $1 paid by a qualified biomass conversion facility up to $49.60 per oven-dry ton of delivered biomass to produce heat, power, bio-based products, or advanced biofuels; (b) establishment payments up to 75% of the cost of establishing a bioenergy perennial crop and (c) up to 15 years of annual payments for woody crops (USDA, 2011). Eligible woody material, collected or harvested, must come directly from the land and, if outside BCAP project areas, must be a by-product of preventive treatments to reduce hazardous fuels, reduce or contain disease or insect infestation, or restore ecosystem health. Although BCAP payments can be received for the production of heat or power, BCAP's primary objective is to reduce the financial risk for landowners switching to energy crops as they prepare for new emerging liquid biofuel markets.

BCAP has introduced a new tiered system of reductions to annual payments based on the use for which the material or crops are sold. Conversion to cellulosic biofuels gets the smallest payment reduction (1%), followed by use of the material for production of advanced biofuels (10%), whereas uses for purposes other than conversion to heat, power, bio-based products, or advanced biofuels get the highest reduction (25%) (USDA, 2011).

The programme formally began in July 2009 and continued through a pilot phase (i.e. Notice of Funding Availability period) that ended in February 2010. Revisions to BCAP were published in the US Federal Register in October 2010. Programme changes aimed to, among other things, ensure programme "additionality" (i.e. additional biomass energy production beyond historical levels), enhance stewardship and conservation measures, protect existing wood product markets, spur the production of liquid cellulosic biofuels production and cap spending. During the Notice of Funding Availability period, BCAP gave out $250 million in matching payments. In total, $461 million are expected to be paid out over 15 years (USDA, 2011).

9.4.2 US market developments

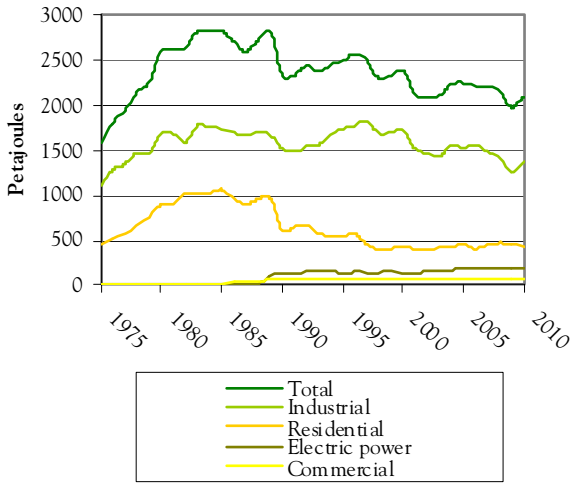
In 2010, wood use for energy was 2,095 petajoules (equivalent to roughly 230 million m^3 of fuelwood), up from 1,984 petajoules in 2009. Overall, use had declined between 2006 and 2009 (graph 9.4.1). The level in 2010 is still 30% lower than the 1985 high of 2,835 petajoules (US DOE, 2011b). The decline is due to decreased residential and industrial wood energy use (primarily by forest products industries). Since 2000, woody biomass has accounted for about 3% of US energy production. Wood energy consumption has declined steadily as a share of all renewable energy consumption, from 45% in 1981 to 28% in 2008 and to 25% in 2009 and 2010.

Residential heating with wood fell to only 390 petajoules in 2001, increased 22% to 475 petajoules in 2008, and declined to 443 petajoules in 2010. In commercial buildings, use has been stable since 2000. Industrial wood energy has declined 11% since 2006. Wood-based electricity production has been on a slightly rising trend: from 136 petajoules in 1990 to 187 petajoules in 2008 and to 199 petajoules in 2010.

In contrast, the production capacity of wood pellets, primarily for residential heating and export, has escalated from 600,000 tonnes in 2003 to over 4 million tonnes in 2009. Exports increased five-fold, from under 50,000 tonnes in 2006 to over 250,000 tonnes in 2008. Capacity is expected to expand further to meet increased demand in export markets (Spelter and Toth, 2009).

GRAPH 9.4.1

US wood energy consumption by user, 1975-2010



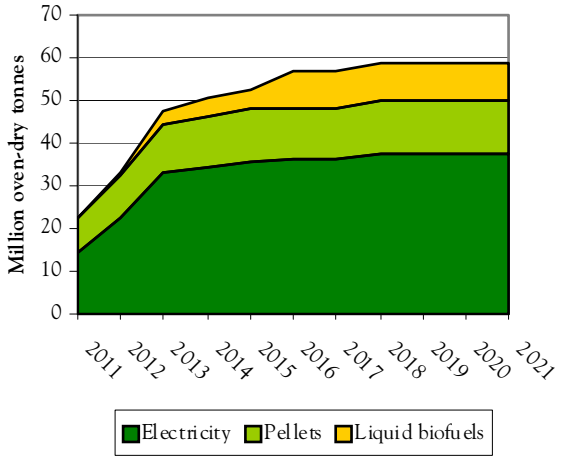
Sources: Adapted from US DOE, 2011b.

Reference Case projections in the 2011 *Annual Energy Outlook* suggest a potential 37% increase in wood energy use by 2030 to 2,870 petajoules (about 315 million m^3 equivalent of fuelwood) (US DOE, 2011a). This outlook assumes natural gas price increases for residential (+13%), commercial (+15%), industrial (+37%) and electric power (+25%) use. It assumes coal prices for electricity generation to increase 13%, and imported oil prices to rise 51%. The outlook for expansion of ethanol production into use of cellulosic feedstocks is projected to be limited to 13-16 billion litres by 2022 under current policies and would not meet the 61 billion litres target for 2022 if these policies are not modified.

An analysis by Forisk Consulting suggests that planned energy project could result in increased wood for energy use to 58.9 million oven-dry metric tonnes by 2021 (graph 9.4.2). Forisk identified announced US wood energy projects for electric power, pellet production and liquid fuel production along with their potential annual wood energy demand. They applied several screens with limitations based on readiness of technology and status. If the project has received/secured/signed two or more of the following, then it passed the status screen: (a) financing, (b) air quality permits, (c) engineering, (d) procurement and construction contracts, (e) power purchase and interconnection agreements for electricity facilities, and (f) supply agreements. The screens are a way to assess the likelihood that projects will complete the development process and actually produce bioenergy. Total wood energy demand passing status screens is expected to total 32.4 oven-dry metric tonnes by 2021.

GRAPH 9.4.2

Projected wood for energy use in the US, 2011-2021



Note: Based on announced US facilities on 25th May 2011 and wood use after applying screens to identify projects that are likely to succeed.

Sources: Adapted from Forisk Consulting, 2011.

9.5 Developments in Canada

9.5.1 *Canada: Policies driving markets*

At the national level, important Canadian programmes include the Pulp and Paper Green Transformation Program (announced August 2009) and the mandate for renewable fuels in the gasoline pool which was scheduled to come into force in 2010. Only one year remains in the Pulp and Paper Green Transformation Program, which was designed to provide funding for forestry companies to finance projects that will, in turn, increase renewable energy production and deliver increased energy efficiency. The maximum funding is capped at Can$1 billion, and at the individual company level is calculated based on a Can$0.16/litre credit for the volume of black liquor produced by their mills between 1 January 2009 and 31 December 2009. Firms have until 31 March 2012 to draw on funding to finance approved capital projects (Natural Resources Canada, 2010). At the time the programme was announced, 24 Canadian companies qualified for credits under the programme. By April 2011, about Can$278 million had been allocated to various projects across the country (Pernegre, 2011).

Canada's national Renewable Fuels Standard mandates an average 5% renewable fuel content within the gasoline (petrol) pool, which will provide an estimated incremental reduction of GHG emissions of about 1 million tonnes of CO_2 equivalent per year, over and above the reductions attributable to existing provincial requirements. Regulations are already in force around this target. The Renewable Fuels Standard also requires 2% renewable fuel in the diesel fuel pool by 1 July 2011. Provincial mandates for renewable fuels are in place in British Columbia (5% by 2010), Saskatchewan (7.5% since 2007), Manitoba (8.5% since 2008), Quebec (5% by 2012), and Ontario (5% since 2007). The legislation contains no provisions for wood-based biofuels.

The Canadian government's plan to phase out coal-fired electricity generation would affect 21 plants, though no legislation yet exists to enforce this policy. The Canadian Wood Pellet Association has lobbied heavily to introduce co-firing of wood pellets with lignite coal, estimating that a co-firing rate of 5% would create a market for 2.6 million tonnes of wood pellets per year, or almost twice Canada's current production capacity (Wood Pellet Association of Canada, 2011). The Association has pushed hard to create policy to support greater uptake of biomass and is working with the Canadian Clean Power Coalition to increase biomass use across the country (Wood Pellet Association of Canada, 2011).

Quebec

Provincial strategies are continuing to lead the way in bioenergy development. In Quebec, about 60 MW of biomass electricity capacity is being developed, and subsidies of up to Can$3 million are being provided for the demonstration of GHG reduction technologies (Energiesvertes, 2011). Bioenergy is seen as a key component in a targeted reduction of Quebec's GHG emissions by 2020.

Ontario

In Ontario, the Green Energy and Green Economies Act (Ontario Bill 150) remains a contentious piece of legislation. Biomass, particularly taken from forests and agricultural operations, has not become a major component of Ontario's electricity mix, despite the presence of a FIT at Can$0.13/kWh. The Ontario FIT provides 20-year contracts. With only 18 MW currently under construction, wood-to-electricity represents only 0.6% of the projects supported by this Act (Ontario Power Authority, 2011). Ontario Power Generation is targeting 2012 as the year it will begin using renewable biomass as a replacement fuel for coal in some of its electricity generating units. The Canadian Wood Pellet Association, while supportive of increasing biomass use, has complained about the Ontario-only approach to biomass sourcing taken by the government, suggesting that such wording would contravene inter-provincial trade law (Wood Pellet Association of Canada 2011). Ontario's Long Term Energy Plan puts biomass-to-electricity at about 1.3% of the total provincial electricity demand, or about 2.6 TWh per year, by 2030, which could require up to 3.1 million green tonnes or 14% of

the annual sustainable harvest in the province (Ontario, 2010). Growth in biomass-to-electricity could also be achieved by increasing incentives available; a recent report suggests that the FIT would have to rise to $CDN 0.273/kWh in order provide a 20-year internal rate of return of 27% and a three-year payback period (Monieson Centre, 2011). The FIT programme is currently under review.

British Columbia

In British Columbia, policy under the title of the BC Bioenergy Strategy has suggested that by 2020 biofuel production could meet 50% or more of the province's renewable fuel requirements. The Strategy commits to developing at least 10 community energy projects over the same period and places the onus on the provincial forest service to establish a comprehensive biomass inventory to help support these projects. The Strategy builds on $CDN 25 million in funding for the BC Bioenergy Network that is meant to drive investment and innovation. In addition, a two-part Bioenergy Call for Power focuses on the existing biomass inventory (BC Bioenergy Strategy, 2011).

9.5.2 Canada: Market developments

The twelve months to June2011 have seen no dramatic changes in Canada's wood energy sector. The country's two major uses of wood for energy are self-generation of power for the forest sector and pellet production for domestic and international markets. In 2008, energy production from wood totalled about 463 petajoules, which is more or less the same as in recent years (IEA, 2011).

The attractiveness of wood energy is strong enough that some large investments have been made in capacity. For example, there are plans to spend up to $CDN 153 million on retrofitting an old pulp and paper mill in Quebec to generate power. A 25MW power plant fed by waste from its operations and from an extensive local network of chip and other biomass suppliers is expected to begin supplying electricity by late 2012. The company further plans to begin production of dissolving grade cellulose for the textile industry by mid-2011.

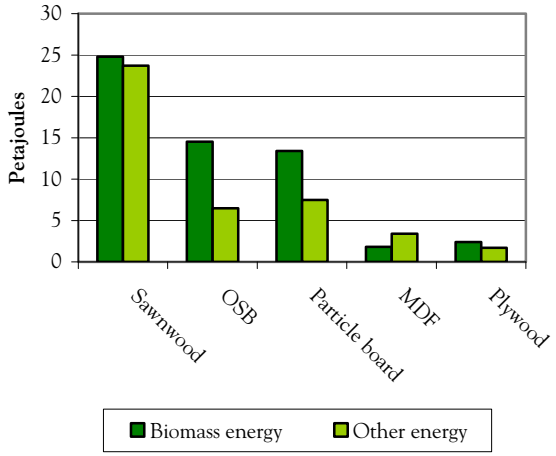
Studies continue to indicate that a wood-energy system has great potential for Canada; for example, it has been estimated that a bioenergy production and delivery system built around the Great Lakes St. Lawrence Seaway system could not only displace all the coal-fired electricity in Ontario but also provide 620 million litres of green biodiesel (Hacatoglu et al., 2011).

A new report released by FPInnovations provides a good sense of how wood energy is used within the forest sector (Meil et al., 2010). It notes that the manufacture of solid wood products and panels does not require much energy, with typical energy costs representing less than 5% of the cost of goods sold. At the same time, industry spending on energy doubled between 1998 and 2008. The incentives provided under the Pulp and Paper Green Transformation Program have driven changes in pulp and paper self-generation. There is significant capacity for energy generation both in solid wood and panel production.

Estimates of annual energy consumption by the various wood processing sectors appear below solid wood and panel production (graph 9.5.1). Softwood lumber production uses the most energy, followed by particleboard, OSB, Medium Density Fibreboard (MDF) and plywood. The amount of biomass energy used in each of these manufacturing processes is significant, ranging from 69% (average for OSB) to about 35% (average for MDF). Other energy used in the process may be fossil-based or, depending upon local electrical generation grid, include renewables such as hydro, solar, or wind power.

GRAPH 9.5.1

Annual energy consumption in Canadian wood industries

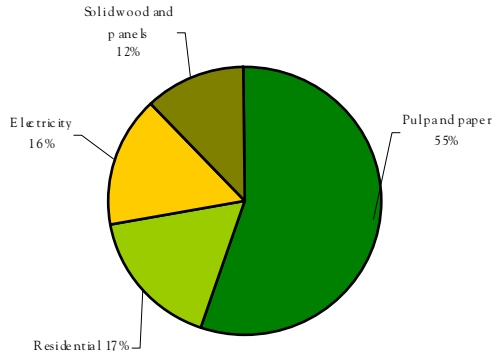


Sources: Calculated with data from Meil et al., 2010, FAOSTAT, 2011.

The breakdown of wood energy consumption by the major users is shown below (graph 9.5.2). The pulp and paper sector is by far the largest user of the annual production of 463 petajoules, which is roughly equivalent to 4.1% of Canada's total primary energy supply (IEA, 2011).

GRAPH 9.5.2

Share of wood energy consumption in Canada, by major users, 2008



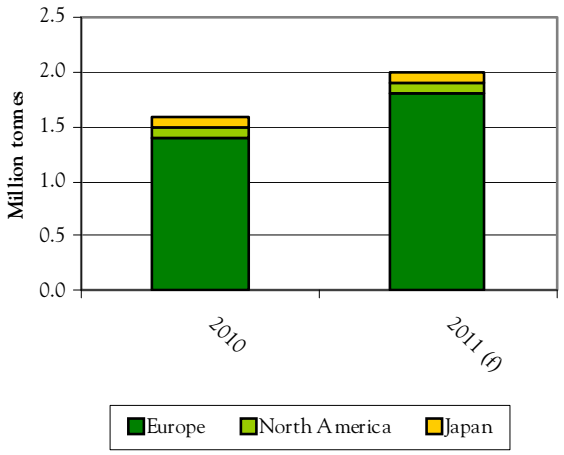
Note: Total energy consumption 463 PJ.

Sources: Calculated with data from International Energy Agency 2011 Meil et al., 2010, FAOSTAT 2011.

Wood pellet production in Canada is continuing to grow and, in 2010, almost 1.5 million tonnes of wood pellets went to overseas markets; most coming from British Columbia. Europe was the principal destination for exports to customers in Belgium, Denmark, the Netherlands and the UK, for co-firing with coal in electricity power stations (graph 9.5.3). Across Canada in 2011, 33 pellet plants were operating at almost their full capacity, about 2 million tonnes.

GRAPH 9.5.3

Canadian wood pellet exports, 2010-2011



Note: f = forecast.

Sources: Wood Pellet Association of Canada, 2011.

Pellet production is concentrated in western Canada (70% of capacity), mainly British Columbia, where average plant capacities of about 118,000 tonnes per year, compare with only 43,000 tonnes in the eastern provinces. Production capacity in the east is growing, however, with Ontario, Quebec and several Maritime Provinces all home to new pellet facilities. Today, around 20 wood pellet plants are in various stages of planning or construction across the country (Wood Pellet Association of Canada, 2011).

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Project Manager

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ABSTRACT

The UNECE/FAO *Forest Products Annual Market Review, 2010-2011* provides general and statistical information on forest products markets and related policies in the UN Economic Commission for Europe region (Europe, North America and the Commonwealth of Independent States). The *Review* begins with an overview chapter, followed by description of the macroeconomic situation. Next it includes an analysis of government and industry policies affecting forest products markets. Five chapters are based on annual country-supplied statistics, describing: wood raw materials; sawn softwood; sawn hardwood; wood-based panels; and paper, paperboard and woodpulp. Additional chapters discuss markets for wood energy, certified forest products, value-added wood products, forest carbon, tropical timber, and market developments in China. In each chapter, production, trade and consumption are analysed and relevant material on specific markets is included. Tables and graphs provided throughout the text present summary information. Supplementary statistical tables may be found on the UNECE Timber Committee and FAO European Forestry Commission website at www.unece.org/timber.

KEYWORDS

Bioenergy, biomass, builders joinery, carbon, cardboard, carpentry, certification, certified forest products, climate change, China, construction, consumption, engineered wood products, EWP, exports, fiberboard, fibreboard, Forest products markets, forestry industry, forestry statistics, fuelwood, furniture, housing market, imports, lumber, market analysis, MDF, OSB, paperboard, particle board, particleboard, plywood, production, pulp and paper industry, pulplogs, pulpwood, REDD, roundwood, sawlogs, sawn hardwood, sawn softwood, sawnwood, sustainable forestry, timber, tropical timber, wood energy, wood fuels, wood industry, wood pellets, wood products, wood-based panels, woodpulp

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